

TECH transfer

U P D A T E

Vol. 6, No. 1

January 2001

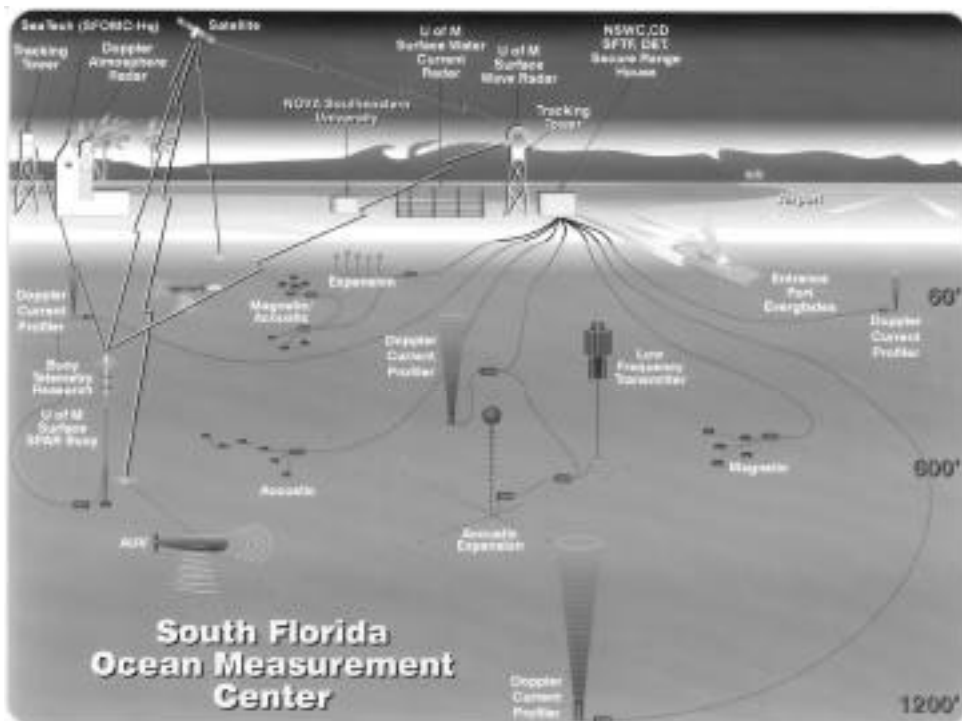
Partnerships Result in Successful Autonomous Underwater Vehicle Demo at South Florida Ocean Measurement Center

The Carderock Division's working partnerships, with academia, resulted in the successful execution of an Office of Naval Research (ONR) sponsored demonstration of Autonomous Undersea Vehicle (AUV) technology at the South Florida Ocean Measurement Center (SFOMC), Ft. Lauderdale, Florida.

This new SFOMC is being developed through a partnership involving the Navy and academia and is now available for government and privately sponsored work. A Congressional grant, along with a combination of other Federal and state money is being used to construct this exciting ocean and surf laboratory in an area with a wide variety of environmental conditions including the Gulf Stream. The partners include: Florida Atlantic University (FAU), University of Miami, Harbor Branch Oceanographic Institution, Nova Southeastern University, University of South Florida, and Carderock Division, NAVSEA.

The lab is being built around the substantial existing in-water assets of the

Carderock Division's South Florida Testing Facility, and the assets of its partners. When completed, real time environmental data covering the atmosphere through the air/ocean interface and down to the sub-bottom will be available. These facilities are available to the entire scientific community for long-term experiments and other ocean related research programs.



(Continued on page 2)

INSIDE



**NAVSES INTRODUCES A
NEW REFRIGERANT LEAK
MONITOR**



Surface Warfare Center Division

Partnerships Result in Successful AUV Demo at SFOMC *(Continued from page 1)*

The AUV Demo was coordinated by Phil Bernstein who serves as Test Director, Dr. Bill Venezia of Carderock, and Doug Briggs of Florida Atlantic University. The event featured small and lightweight AUVs from several groups, each with different and complementary missions within the overall mine countermeasures (MCM) mission: Ocean Explorer, under development by FAU; REMUS, under development by Woods Hole Oceanographic Institution; Lockheed Martin's CETUS vehicle; and NAVSEA Panama City's Lemming tracked vehicle, which crawls along the ocean floor. In addition to the vehicles, developers from the MCM environmental and tactical modeling community, represented by the Naval Postgraduate School and SAIC, participated. The first week of activity focused on allowing each vehicle practice time operating within the natural laboratory of SFOMC against a known, existing field of mine shapes and mine-like objects (MLOs). The second week was the true dress rehearsal, where each group operated against a field of mine shapes and MLOs installed just for this event, the form and location of which were kept secret from the participants. According to Dr. Swean, the demonstrations were the first ever to exhibit cooperative missions by multiple vehicles, each with different functionality. Of primary interest to near-term Navy needs was the demonstrated ability to perform wide area reconnaissance missions to detect and classify mines and MLOs in the water and then execute subsequent missions to re-acquire suspected mines for purposes of positive identification.

In its dual roles of host and joint execution, SFOMC successfully provided the full spectrum of execution and logistical support. The intense pre-event collaboration between Venezia, Briggs, and Bernstein started last December when ONR decided to conduct the event and locate it at SFOMC. The key factors in ONR's decision were the tremendous amount of relevant infrastructure that SFOMC brings to bear, both shoreside and in-water, as well as FAU's strong track record in AUV development and operation. Among the SFOMC services:

- ◆ Provided range operations, configuration management, and range safety;

- ◆ Became the trusted agent for accurately (at a required accuracy greater than that of the AUV detection systems) and confidentially planting the mine shapes and MLOs in a rigorous shallow water environment;

- ◆ Developed all environmental procedures, permits and documentation, including working with the local state park to ensure the safety of both people and sea turtles;

- ◆ Provided post-event ground truthing of all the contact data produced by the various AUVs;

- ◆ Provided laboratory, machine shop, and meeting space for each participant;

- ◆ Provided large and small boats needed for AUV deployment; and

- ◆ Converted a lecture auditorium for the two weeks into a Command and Control center complete with internet access and workstations for each group.

The final, and most significant factor in the success of the operation was SFOMC's development into a natural, real-world laboratory. While the juxtaposition of the words "real-world" and "laboratory" may in the past have produced visions of an oxymoron, in the case of SFOMC, it is producing a new paradigm in ocean research and experimentation. SFOMC combines a real-world, operational Navy facility, with a densely populated field of real-time, high-fidelity, continuously operating, continuously accessible environmental instrumentation from the shoreline out to the 150-meter depth contour. This real-time environmental aspect is a direct benefit of Navy's participation in the SFOMC partnership. The result is truly the best of both worlds. SFOMC represents a real-world environment, where a technology developer can expect to operate in an environment more rigorous and realistic than that achievable in any kind of laboratory, with a degree of environmental and boundary condition knowledge previously available only in a controlled laboratory situation.

The point of contact for SFOMC is Garth Jensen, (JensenGA@nswccd.navy.mil), Executive Director, (301) 227-2926.

Tech Transfer Includes Spin-On and Dual Use NAVSEES Introduces a New Refrigerant Leak Monitor to the Fleet

By James Winward

A new refrigerant leak monitor has recently been approved for shipboard installation as a result of NSWCCD-SSES life cycle manager efforts in reducing total ownership cost. The new monitor is the latest commercial technology with modifications to meet shipboard environmental requirements. The new monitor will replace older halocarbon monitors (presently installed on ships in a limited capacity for crew safety) and will be installed at additional locations to save money and reduce the Navy's impact to the earth's environment.

A refrigerant leak monitor is a permanently-installed device that continuously samples the air for leaks near refrigeration and air conditioning equipment. The monitor measures refrigerant concentrations in parts per million and provides front panel readout and alarm indications, as appropriate. One monitor can sample up to eight separate locations by using sample tubing. A user-friendly data logging feature is incorporated into the monitor, so ships can bring up the time, location, and severity of all leaks on the front panel display. Since most leaks start as small leaks, ships will be able to take action before the leak reaches critical levels, thereby saving costs on replacement refrigerant, reducing the environmental impact in systems where ozone-harming CFC refrigerants are used, and reducing downtime of critical shipboard air conditioning systems. In addition, replacing older halocarbon monitors relieves ships of an expensive maintenance burden, while improving safety coverage to areas that were not feasible to monitor previously. Compared to the halocarbon monitor, the refrigerant leak monitor is one-third the cost to purchase and one-fifth the cost to maintain. A standard monitor detects all of the Navy's refrigerant types. Also, the new monitor is qualified to the Navy shock, vibration, and electromagnetic compatibility standards.

The effort to bring this new equipment to the Fleet began under sponsorship of NAVSEA. NSWCCD-SSES conducted market research and testing, which led to development of a procurement specification for a standard Navy unit. The new refrigerant leak monitor was selected as a result of com-



Installed refrigerant leak monitor

petitive contracting. A requirements contract for greatest value, as opposed to low bid, was initiated with an order placed for the first article unit. The commercial monitor offered by Parasense Incorporated was then selected based mainly upon the technical evaluation, which considered features such as maintenance, life cycle costs, user-friendliness, and modular replacements parts. During first article testing, minor changes were made to the commercial unit to make it shipboard compatible: EMI filter in alarm wiring, waterproof switch on alarm beacon, improved door gasket, more rugged wire connectors on circuit board, additional door latches, and external shock mounts. Other than the door latches and shock mounts, which could be purchased as separate accessories for "Grade A" shock applications, the other changes were minor and were also incorporated into the company's commercial product line.

The new monitor is being phased into new construction programs. The monitor was recently installed on USS *Oscar Austin* (DDG 79) (*see photo*) by Bath Iron Works, and materials have been purchased for later ships of that class. Backfit of the new monitor onto existing surface ships is expected to be accomplished. The POC for this equipment improvement is Jim Winward (WinwardJM@nswccd.navy.mil), who can be reached at (215) 897-8783.



CARDEROCK DIVISION
NAVAL SURFACE WARFARE CENTER

NSWC

<http://www.dt.navy.mil>

Maritime Applied Physics Corporation Signed a CRADA with Carderock Division

On 17 October 2000, Naval Surface Warfare Center, Carderock Division (NSWCCD) and Maritime Applied Physics Corporation (MAPC) signed a Cooperative Research and Development Agreement (CRADA), which is entitled *Air Conditioning Compressor Improvement* and has the Agreement number of NCRADA-NSWCCA-01-044. The CRADA was established through the Technology Transfer Office at NSWCCD in less than three weeks. The Agreement is to jointly identify and analyze numerical techniques to increase the efficiency of centrifugal compressors and to fabricate and test promising configurations obtained from the numerical investigation. The technical objectives of the CRADA are to develop methodology for an accurate numerical characterization and an improvement through configuration reshaping of the flow fields in the centrifugal compressor's diffuser and volute used in ship-board air-conditioning systems. Expected increases of at least 10% in the compressor isentropic efficiency could lead to Fleet-wide savings of \$4 to \$6 million per year depending on the cost of fuel. These improvements in air-conditioning compressor design will also improve the efficiency of commercial products. The technical point of contact is Dr. Yu-Tai Lee (LeeYT@nswccd.navy.mil), (301) 227-1328.

TECH *transfer* UPDATE

DEPARTMENT OF THE NAVY

NAVAL SURFACE WARFARE CENTER, CARDEROCK DIVISION

9500 MACARTHUR BLVD.

OFFICE OF RESEARCH AND TECHNOLOGY APPLICATIONS, CODE 0117

WEST BETHESDA, MARYLAND 20817-5700

January 2001, Volume 6, Number 1
Tech Transfer Update, (ISSN 1084-6557) is the publication of the Office of Research and Technology Applications, Code 0117.

Tech Transfer Update is published in accordance with NAVSO-P35. Articles appearing in the ***Tech Transfer Update*** may be summaries and news briefs from NSWCCD's publications. Manuscripts submitted for publication, correspondence concerning prospective articles, and changes of address should be directed to Carderock Division, Naval Surface Warfare Center, Office of Research & Technology Applications, Code 0117, 9500 MacArthur Blvd., West Bethesda, Maryland 20817-5700.

CAPT Steven W. Petri, USN, **Commander**

Richard E. Metrey, **Director**

Dick L. Bloomquist,
Director, Technology Transfer
(301)227-4299

bloomquistdl@nswccd.navy.mil
Fax (301)227-2138

Henry Strunk
Patent Licensing Manager
(301)227-1529
strunkh@nswccd.navy.mil

Geraldine Yarnall, **Outreach
Manager, and Editor**
(301)227-1439
yarnallgr@nswccd.navy.mil

James E. Wood, **CRADA
and SBIR Manager**
(301)227-2690
woodje@nswccd.navy.mil

John Forrest
Intellectual Property Counsel
forrestjl@nswccd.navy.mil
(301)227-1834

Yvonne Byrd Watson
Production Editor
(301)227-1146

Approved for Public Release;
distribution is unlimited.